Innovating in sectoral governance and development with ICT in agriculture, education and health

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Summary

Background and purpose of the study

This study analyses *whether* and *how* it is possible to achieve sustainable and scalable ICT applications, which contribute to development and poverty alleviation. Important principles were participation, dialogue and ownership. A familiar image is the 'round table of King Arthur. It refers to consultation between different parties based on dialogue, equity and overlapping objectives. This was different from the usual hierarchical way of working and governing. This study is about a similar approach to the development process.

The point of departure for this study is t*he problem that many ICT projects in developing countries fail*. There are some obvious and immediately apparent reasons for this, for example a lack of training, when the donor leaves there are no more funds, etc. But we do not really know much of the underlying processes to integrate a technology like ICT, in a sector in such a way that it has a broad societal relevance. The failure of ICT projects is not only a waste of time and resources, but especially a missed opportunity. ICT contributes significantly to the economic development in the West. In principle ICT can also be significant for development and poverty alleviation. Examples include price information systems for farmers, e-learning and management information systems in healthcare.

Moreover, the effectiveness of development cooperation needs further improvement. Often the recipient countries lack an effective development-oriented ideology and the weberian substance of the bureaucracy is weak. The current emphasis in development cooperation on government draws heavily on the bureaucracy of the recipient country. From the perspective of technology and innovation, there is a tension between the need for renewal and the ingrained resistance to change that is characteristic for many bureaucracies. In this context, many authors emphasize the importance of broad participation to make the development efforts more effective.

This thesis aims to develop insights to reduce the problem of failing ICT applications. The aim of this research is:

> *To study ways to identify, design and implement sector-wide ICT applications novel to the local context that are relevant to development and at the same time sustainable.*

Theoretical perspective and research questions

The theoretical perspective is based on the social shaping of technology. Technology is conceived as heterogeneous and composed of tangible and intangible elements; it is a configuration that works. Hence, technology is a social construction. ICT applications that are new in the local context are perceived as innovations. Even though a number of

elements are acquired as so-called standard solutions, it remains necessary to interpret the technology in the local context and to re-configure the organizational solutions. This approach is seen as new and relevant in IS literature.

Next, a search was undertaken for different methods for the identification and development of ICT applications that were practiced in the developing countries. These methods should be genuinely participatory and involve all relevant stakeholders. Also, a sector-wide perspective is needed, because ICT applications are increasingly interlinked and the technology is co-constructed in the local context, whereby all relevant actors have to be involved. In practice this is a (sub) sector, if it is considered a relatively autonomous system. It is also interesting to consider the *whole* process; from identification to making the ICT solution sustainable. This search was extensive, but yielded little result.[1] The Round Table (RT) process as developed by the International Institute for Communication and Development (IICD) matched best with the conditions. It was also practical to study this process because the researcher had easy access to it. The RT process as applied in different sectors and countries is used as case material in this study.

The objective of the study design led to the following questions: How can the RT process be conceptualized? And what are the relevant innovation processes leading to the successful development of an ICT application at organizational level? How effective is the RT process? And what factors influence the scalability of ICT applications that are novel to the local context, yet with proven functionality in that environment?

Conceptualizing the RT process

Based on a number of case studies, as described in chapter 4, the RT process could be conceptualised as an operationalisation of Constructive Technology Assessment (CTA). This approach took shape from about 1995 onwards. The insights of CTA are used in practice, but are not spelled out in operational terms. The processes making up CTA and the RT process can be organized into five categories:

1. Creating the social conditions whereby all relevant stakeholders can meet and exchange knowledge in a participatory way;
2. Moving step-wise and iteratively from problem to vision, to idea, to decision-making and action;
3. (Social) learning, both substantively, procedural and reflexive;

1 Other interesting approaches were: (1) the Health Information System Programme, but it is limited to monitoring public health data and has developed for that purpose an open source solution and (2) the Global-Schools and Community Initiative, but it struggled with the implementation of ICT applications and has shifted the focus to be an expertise centre particularly on policy development.

4. Setting a societal agenda, collaborative decision-making, mutual adjustment between actors including interactive policy-making;
5. Communicative actions, amongst others with the objective to inform the public.

Further insight into the processes that underlie the development and the realization of ICT applications resulted from the analysis of an ICT project that first failed and then succeeded. It was the introduction of ICT in a municipality of Dar es Salaam in Tanzania. This is described in chapter 5. This analysis confirmed that CTA is a promising approach for the development of ICT applications.

The RT process turned out to comprise three development cycles: (1) RT workshop, (2) the formulation and the implementation of ICT applications and, (3) the integration of ICT applications in the organization and the sector concerned. The RT process takes about four to seven years. The evaluation of the RT process is done in two steps; first the RT workshop and based on a successful workshop, the continuation of the RT process.

Evaluation of the RT process

The RT workshop lasts three to four days and includes scenario planning, vision building, and identification of areas for change that can have a leverage effect on desirable change in the sector. Thereafter the information and communication flows are identified in each of these areas. Subsequently the priority areas for change are selected where ICT can play a role. This provides a basis for brainstorming on ideas for ICT applications novel to the local context. Next the most promising ICT applications are prioritised by the participants and turned into annotated proposals for prototype development.

The RT workshop was evaluated using three case studies (agriculture in Mali, and education and health in Tanzania) and the findings were compared with seven other RT workshops elsewhere. This is elaborated in chapter 6. In these sectors ICT was hardly applied at the time the RT process started. The RT workshop turned out to be a robust CTA process in its initial phase. The participants represented different 'voices' in the sector and the process was labelled as highly participatory. Reflexive learning was an important outcome. There were 8 to 10 ICT prototypes identified, which were regarded as a good reflection of the priorities in the sector as experienced 'on the ground' and as reflected in the sectoral policies. An important outcome is the development of ownership; an intrinsic motivation of a participant to realise his/her ICT solution. The quality of the results of the RT workshop were strongly related to the quality of the preparation of the workshop.

In view of the complexity, the long time-span involved and the multitude of external influences, the research on the effectiveness of the continuation of the RT process is done by means of a single case study; namely the introduction of ICT for secondary education and teacher training in Tanzania. The research covered the period 2002 to mid 2006 (see chapter 7). During the RT workshop ICT applications were identified such as web applications for students, setting up computer labs in schools and teacher training colleges, the use of ICT in lessons, an interactive data base for the inspectorate, etc. The evaluation was done based on indicators for process conditions and for effectiveness. The findings were compared with the results of twelve other RT processes held in sub-Saharan Africa and Latin America.

The process conditions such as participation, dialogue and knowledge exchange could be properly maintained. But the social network withered over time, because the public sector gradually withdrew (for reasons outside the scope of the RT process). Learning played an important role for the teams that developed the ICT applications. A weakness was that the training in marketing and finance started late. Also the end-users participation during the development of the ICT applications should have been stronger. During the implementation of the ICT applications (end) users provided structured feedback. This feedback was provided during focus group sessions with all teams involved. For larger organizations, change management was key to the integration of ICT applications.

The indicators for the effectiveness of the RT process are:(1) a comparison with an external norm for ICT project success rate, (2) the integration of ICT applications and their subsequent improvements in the organization, (3) the impact on users , (4) the impact on poverty alleviation and (5) the integration of ICT at sector level. The external norm for success rates of ICT projects is estimated at roughly 15-45% in industrialized countries (Heeks, 2002). For the RT process of education in Tanzania this stood at 55% in mid 2006. This could have been even significantly higher if the RT process had succeeded in establishing public-private collaboration. Based on a number of other cases within IICD, a rough and indicative estimate is a success rate of around 60% for ICT projects that were formulated during RT processes.

The ICT applications integrated well in the various organizations. Within the small NGOs this was obvious. In the medium and larger organizations, like the teacher training colleges, change management was important. The outreach within the education sector was wide and substantial. Most users indicated that they had achieved their goals. The impact was estimated as 'high' by 60% of the end users. Empowerment, i.e. empowering the user, was relatively low when compared to other RT processes. Furthermore, the direct impact on poverty alleviation was limited, since only one ICT application was developed specifically for this purpose. In other RT processes often more ICT projects were developed by and for representatives of the poor. The RT process probably had a beneficial effect on conditions for poverty alleviation. So far the

score is relatively positive for the RT process, but the integration of ICT applications at the sector level was a hard and complex challenge, while the instruments for influencing were limited. This is interesting because the problem of integration and scaling are general for innovation and new technologies. This is elaborated in chapter 8.

Scalability and integration

The essence of CTA and the RT process is that the technology is developed in such a way as to have broad societal relevance, while at the same time the desired technology is integrated into the sector, or rather the societal domain to which it relates. The wide scope and the high impact gave a good indication of societal relevance. The last research question was: which factors influence the scalability of ICT applications that are novel to the local context, yet with proven functionality in that environment? Scalability includes to scale up and to replicate. Scalability means that ICT applications are accepted and integrated not only in the niches that the ICT projects constitute, but gradually in the whole education sector. In view of the developmental relevance, which was confirmed by the policy-makers, and the large public awareness of the ICT applications, one would assume that scaling up and replication would be an easy and obvious process. Nothing is further from the truth. In the private sector the ICT applications spread relatively quickly after RT workshop. In the public sector this proved to be difficult, despite the wide publicity and the positive attention of most policymakers. Therefore in 2003, as a part of the RT process, an interactive policy-making process was initiated. The process was of decisive importance to come to an ICT policy for the education sector, and thereby to integrate ICT in the public sector. This policy became official in 2007.

In order to better understand the processes involved in the integration of technology into a sector, use is made of the theoretical framework of socio-technical transitions (Geels, 2005). This theory describes the development and integration of technology into a sector, or rather a societal domain, and is closely related to CTA. The RT process is primarily aimed at developing the niches. These are spaces in which innovations are generated and developed. But if the applications are sufficiently mature, they have to break out of the niche and become integrated into the specific regimes, for example private education. A regime is a semi-coherent set of rules shared within a group related to the selection and use of the technology for a particular societal function. The socio-technical regime is the dynamic coordination or complex alignment of the different specific regimes that influence each other and that constitute together a societal domain. Integration of ICT in the education sector implies that ICT becomes part of the socio-technical regime.

The resistance to the integration of technology in the case study, concentrated mainly in the specific regimes of policy-making in education and of educational technology.

The study analyses the changes in these specific regimes. This is situated against the background of macro developments and the persistent problems that occurred in the education sector. An example of a persistent problem is a decrease in quality of public education in spite of the investment programmes.

Thereafter the key processes and interventions are described that contributed to the integration of ICT in the education sector and thus the scalability and sustainability of ICT applications. This resulted in the formal institutionalization of ICT in the education sector and consequently the allocation of budget for ICT. This repertoire of interventions is relevant in practice as few heuristics exist in this field. This analysis also led to a further refinement of the concept of scalability by identifying the following four dimensions: functional expandability, user acceptance, market expandability and the perceived degree of change of the socio-technical regime.

This case study also indicates that there is a willingness to accept incremental and moderate radical changes, provided they come about gradually. This is also reflected in the ICT policy for education that points out a number of substantial changes. This demonstrates that ICT can act as a catalyst for social change.

What to take away from this study

In summary it can be concluded that the RT process is an operationalisation of CTA and is an adequate and effective approach for the identification, design and implementation of sector-wide ICT applications that are relevant for development and sustainable. The theoretical and practical results from this study are:

- Specific heuristics for the design of sector-wide ICT applications, an area where still little is available.
- For the identification and development of individual ICT applications, this study conveys an 'emergent' approach, whereby the required changes in the organization are generated 'bottom-up' in the organization. This also places more emphasis on real participation and ownership than the current 'planned change' approaches, which are more 'top-down' oriented.
- A better understanding of how ownership is established in development projects and how this can be 'grown'.
- Better insight into the potential conflict that the development of a new technology entails and suggestions for change management.
- The importance of systems thinking for CTA and the usefulness of system-based tools like causal loop diagrams and value attribute analysis.

Most interesting in this study is the advancing insight into the underlying processes to achieve technologically induced innovations with a broad societal relevance. This often leads to the emergence of unique win-win opportunities in the RT process that could address a number of persistent problems in the sector and accelerate development. This opens the possibility to develop the RT process into a heuristic to bring about reflexive system innovation. As a postscript it may be noted that the RT process in the health sector in Tanzania could possibly result in such a system innovation.

For development cooperation, this study contributes to the rediscovery of the importance of technology in development. It also maps out an approach for participatory and result-oriented planning based on action, reflection and feedback. The implementation of an interactive and participatory approach contributes to the development of democratic values and the high rate of dialogue stimulates learning by all partners involved in development. It reinforces the potential for effective development and governance from 'inside out'.